

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of

Amendment of Parts 1, 21, 73, 74 and 101 of
the Commission's Rules to Facilitate the
Provision of Fixed and Other Advanced
Services in the 2150-2162 and 2500-2690
MHz Bands

Transforming the 2.5 GHz Band

WT Docket No. 18-120

**COMMENTS
NORTHERN MICHIGAN UNIVERSITY**

The Board of Trustees of Northern Michigan University ("NMU") submits these comments in response to the referenced Notice of Proposed Rulemaking, released May 10, 2018 ("*Notice*"). In its consideration of new rules for the Educational Broadband Service ("EBS"), NMU urges the Commission to recognize the critical need for broadband in education and the role EBS 2.5GHz spectrum plays in delivering educational content to learners of all ages. Specifically, NMU believes the Commission should pay close attention to the unique challenges faced by rural educators and their communities and carefully consider how advances in technology, the continued availability of EBS spectrum and the demonstrated successes of on-line learning can work together to deliver cost-effective courses, curriculum and training programs, and indeed even Internet access, to their populations. In rural areas such as those in Michigan's Upper Peninsula served by NMU, often characterized by lower levels of education and income, it is more critical than ever that families be able to access affordable Internet access.

NMU also encourages the Commission to adopt rules to rationalize the Geographic Service Areas (“GSA”) of existing licenses, and to issue new EBS licenses to qualified educational entities, including incumbent licensees.

Background

Founded in 1899, Northern Michigan University is located in Marquette, in the state’s Upper Peninsula on the southern shore of Lake Superior. In 1999, NMU became one of the nation’s leading notebook universities, embracing the concept of one-to-one computing for all students. With robust on-campus network services, the University turned its attention to providing affordable broadband for students living off-campus through experimental Wi-Fi hotspots throughout the City of Marquette. While Wi-Fi hotspots proved less than effective, the effort demonstrated how valuable wireless Internet technology could be for commuting students. In 2008, NMU launched an effort to construct the nation’s first educational WiMAX network. To complete this ambitious project, the University, seeking EBS spectrum, petitioned the Commission to waive its April 2003 “freeze” on the filing of applications for EBS licenses. As part of its request, NMU demonstrated the hardships educators and students faced without adequate broadband and how the public interested would best be served using new EBS authorizations.¹ In granting the licenses, the Wireless Telecommunications Bureau (“Bureau”) imposed three conditions: 1) NMU may not lease the spectrum; 2) NMU’s GSA must not include any portion of a previously licensed EBS facility; and 3) that due to its proximity to the Canadian border, the University must obtain appropriate international coordination if required. With EBS authorizations secured, NMU constructed an advanced WiMAX network in 2009 and began

¹ Initial WiMAX operations commenced pursuant to grants of Special Temporary Authority (STA) obtained over a four-year period. In 2012, NMU applied to convert its 25 STA channels to permanent EBS channels, now licensed as WQST802, WQST793, WQST798, WQST801, WQST799, WQST802 and WQJZ200.

providing off-campus, 4G wireless broadband to its students in the Marquette GSA. As constructed, the network covered nearly 230 square miles.

The service quickly became a success as, for the first time, thousands of students had ubiquitous off-campus access to the University's Learning Management System ("LMS"), course-content and Internet research information. NMU's WiMAX network was so successful that it drew a visit to campus from President Obama in February 2011.² At that time, the President discussed the National Wireless Initiative and held up NMU's network as a model for the deployment of wireless broadband in rural areas. The President also toured NMU's interactive television facilities and used them to communicate with schools that relied on NMU's WiMAX network.

NMU recognizes that the initial success of its WiMAX network was due to three key factors. First, without the Wireless Telecommunications Bureau's and its Broadband Division's strong belief in NMU's wireless project and the Commission's willingness to "take a chance" on a self-deployed, commercial-grade, 4G network operated by a public university, the idea would have died on the vine. Second, NMU understood that times had changed and that lower-cost, less complex 4G wireless equipment made it possible for a mid-sized university to leverage its in-house technical resources to construct an advanced network. Finally, NMU realized that strong partnerships with other educators and small, rural towns and cities held the key to sustaining a community wireless network over the long-term. The formula worked, and as word spread about the availability of educational broadband in the Marquette area, neighboring schools and communities throughout the Upper Peninsula began contacting NMU to ask how

² See, e.g., Mimi Hall, Obama to Promote Northern Michigan University's WiMAX System, USA TODAY, Feb. 8, 2011; Press Release, President Obama to Discuss National Wireless Initiative in Marquette, Michigan, Feb. 4, 2011, at <https://obamawhitehouse.archives.gov/the-press-office/2011/02/10/remarks-president-national-wireless-initiative-marquette-michigan>.

they could extend the service to their own region.

As a result of these requests and our observation that WiMAX was being supplanted with more capable Long-Term Evolution (“LTE”) technology, NMU made the decision to sunset its WiMAX network and migrate to LTE. At the same time, the University developed plans to expand its initial Marquette EBS coverage area and apply for EBS spectrum in six adjacent GSAs. Not only was NMU interested in expanding extended-learning opportunities for its own students, but the University believed a robust LTE data network could also positively impact the K-12 school “homework gap” problem and aid in the delivery of community colleges courses, healthcare education and workforce development programs throughout the region. Additionally, NMU felt affordable broadband to rural homes could provide continuing education and basic life skills information needed by working families. In November of 2015, NMU again filed requests for waivers of the EBS filing freeze and, based on its success with wireless Internet in the Marquette region, received authorizations for six additional licenses to extend the reach of its LTE network.³

Today, NMU operates the nation’s largest, self-deployed, educational LTE network covering significant portions of the 12,764 square miles of rugged terrain in Michigan’s rural Upper Peninsula. Nearly 9,000 of its students, faculty and staff access this network to complete study and teaching assignments. NMU offers its educational broadband service throughout Michigan’s Upper Peninsula over an eight-GSA region, primarily in areas where commercial broadband is unavailable. Even where there is overlapping service with traditional cable or DSL broadband, NMU’s LTE provides an affordable alternative that is specifically designed to serve

³ Authorizations granted in 2016 by the Commission include WQXK924, WQXL755, WQXM461, WQXM685, WQXM686, WQXM697 covering the South Central Upper Peninsula, Western Upper Peninsula, Northeastern Wisconsin, East Central Upper Peninsula, Eastern Upper Peninsula and West-Central Upper Peninsula respectively.

educational needs. The University provides over 435 courses that benefit from on-line access. Of the total number of courses offered annually, an average of 2,500 classes use the University's online course management software, EduCat, to facilitate faculty and student access to class notes, research material, assigned readings and multi-media content. Additionally, NMU offers 219 online courses that allow enrolled students to complete their coursework without having to maintain a physical presence on NMU's campus. Web-based courses such as these continue to grow in popularity due to the flexibility they afford students who increasingly must balance the demands of employment, school, and family obligations.

NMU's Educational Access Network

The growth of NMU's LTE network has opened new opportunities for NMU to address educational broadband access concerns throughout its multiple-GSA region. In 2016, NMU launched its Educational Access Network ("EAN") as a means of extending learning opportunities to K-12 students needing Internet access and non-degree students of all ages who seek help with basic life or career / technical skills. The EAN offers families with school-aged children a Child Internet Protection Act ("CIPA") compliant, filtered service that delivers, to the home, an Internet connection identical to the one used in their children's public school. This added protection provides a safety margin for families who desire added Internet security. The EAN also offers individuals interested in non-credit education with Internet access and learning modules covering a wide range of self-help and workforce development topics. Accessed through a web portal, the EAN on-line link⁴ takes students directly to degree and non-degree

⁴ The NMU EAN web portal (<https://www.nmu.edu/ean/>) provides individuals with all information required to acquire, maintain and manage their EAN enrollment. It also includes links to all course and learning module content that comes with their Internet service.

programs, offering them a “one stop shop” for on-line learning. It also guides users through a simple Internet service registration process and even lets them choose the type of Customer Premise Equipment (“CPE”) device⁵ that is best suited for their needs.

Since launching the EAN in 2016, NMU has registered over 2,450 non-degree seeking students on its LTE network and is adding approximately 180 students each month as service areas continue to expand. In addition to serving a number of small townships and municipalities, NMU has also established LTE transmitter sites that serve two Native American tribal communities.

Rationalizing Existing Licenses

NMU supports the Commission’s proposal to rationalize circular GSAs of existing EBS licenses by expanding them in appropriate cases to recognized geographic boundaries. This would have a number of advantages, including eliminating inefficient and disruptive gaps between existing licensed service areas. In NMU’s own situation, as reflected by the attached map showing NMU’s licensed circular GSAs, it is apparent that these gaps disrupt coverage. In addition, rationalizing GSAs would conform licenses to geographic units recognized by the FCC’s Universal Licensing System and enable a process by which new EBS license opportunities can be efficiently identified, applied for, processed and granted by the Commission. NMU believes that counties would be the most appropriate basis for both rationalization and new licensing. In its own situation, expansion to county boundaries would eliminate the gaps in its coverage in the Upper Peninsula.

NMU urges the FCC to implement a rationalization process in the most efficient manner

⁵ NMU offers a choice of indoor, outdoor or hotspot CPE devices capable of delivering LTE service up to nine miles from an LTE transmitter site. Equipment can be user-installed and NMU provides a help-desk service that guides enrollees through the set-up process, if necessary.

possible. The *Notice* suggests that the Commission might do this in two discrete steps -- an automatic expansion for all licensed GSAs to a smaller geographic unit (such as a Census Tract), followed by an application process limited to certain EBS licensees for further expansion to a larger geographic unit (such as a county). However, NMU believes it would be better for the process to be accomplished in a single automatic step, applicable to all EBS stations whose GSAs currently cover a portion of a county and are adjacent to “white space” in that county, consistent with the proposal set forth in the “consensus plan” submitted to the Commission by the EBS community in 2014 (referenced in the *Notice* at note 23).

Licensing EBS White Space

NMU believes that all *bona fide* educational institutions should be able to apply for new EBS licenses and the *Notice* seeks comment on the requirement that applicants in the priority filing windows have “local presence.” *Notice* at ¶ 29. It is NMU’s experience that in rural areas, local educational institutions, particularly K-12 schools, often lack sufficient technical and financial resources to successfully deploy broadband service. We believe that partnerships between two or more educational or governmental institutions, where at least one partner’s primary mission is education and a second partner maintains a local presence, would best serve the public interest and either party to such arrangement should be eligible to apply for a new EBS license. Such partnerships would bring together institutions with a common interest and create an environment where the combined resources of the partners could assure the efficient delivery of Internet service needed to support education.

NMU has a long history of collaborations of this sort and understands their benefits. As an example, NMU recently collaborated with a local school in Engadine, Michigan, where NMU sought to construct an LTE tower on a remote parcel owned by the school. Through an

agreement with the school that trades network access for use of school property, NMU is providing LTE service for the community that will bring affordable broadband to Engadine students and their families where, presently, the only option is costly, data-capped satellite service. Such cooperative arrangements help reduce construction and operational costs that ultimately lead to a more sustainable wireless network service.

With regard to the number of channel groups available to an applicant in the priority filing windows, NMU recommends that there be no restrictions. NMU has engineered its fixed/mobile, wireless, LTE broadband service such that clients receive 25Mbps down and 5Mbps up using carrier aggregation and channel-bonding. The University uses a mix of Frequency-Division Duplexing (FDD) and Time-Division Duplexing (TDD) technologies in meeting the technical requirements of client customer premise equipment (CPE) devices. As a result, individual tower sites operate with multiple sectors using 15MHz, 20MHz and 40MHz channels supporting Multiple In – Multiple Out (MIMO) services.

NMU is already looking toward the future and will soon take delivery on a new LTE Core that supports 5G wireless service with the capability of providing even greater download and upload speeds to client devices. As the number of clients attached to individual LTE cell sites grows, the University believes access to larger blocks of spectrum will better accommodate the growth we see with LTE wireless services. That growth, coupled with robust service to clients will keep NMU's EAN viable over the long-term and help the University deliver a host of new educational services that includes virtual reality, 4K streaming media and other broadband content that has yet to come to be developed. Indeed, restricting applicants to a limited number of channels will likely prove frustrating to the licensee and inhibit the delivery of expanded learning services that are now just arriving on the market.

EBS and Broadcasting

In addition to its EBS licenses, Northern Michigan University operates noncommercial educational television station WNMU in Marquette, a member station of the Public Broadcasting Service⁶. With DTV technology, WNMU multicasts public and educational television program services, and NMU believes it is ideally positioned to leverage the advantages of both LTE and broadcasting to deliver educational content.

NMU has started to explore the potential connection between EBS-based wireless broadband transmissions and programming that could be broadcast over-the-air through Internet Protocol (“IP”). The pending transition of broadcast television to ATSC 3.0 offers great possibilities when combined with power of wireless communications. Wireless service such as LTE transmissions, as a one-to-one communications platform, has significant bandwidth limitations when streaming content requested by multiple devices. Broadcasting, as a one-to-many content distribution service, could easily be used as a secondary streaming media delivery platform to assist in off-loading bandwidth intensive content. As manufacturers begin to offer mobile and fixed receivers capable of LTE and ATSC 3.0 reception, the resulting efficiencies could be especially useful in the delivery of instructional courses, making a substantial impact in helping to stem the rising costs of providing educational services.

Preserving EBS Licenses and Regulatory Environment

Given the value of EBS licenses and the success of the Commission’s current regulatory model for EBS, NMU urges the Commission to avoid changes to its rules that would disrupt

⁶ WNMU operates on VHF channel 13 covering approximately 11,800 square miles throughout Upper Michigan and Northeastern Wisconsin and overlaps significant portion of the University’s EBS GSA coverage. The station currently offers a variety of educational and cultural programming on three, discrete channels and as part of the Commission’s repack order, will be migrating to VHF channel 8. While undergoing its channel reassignment construction work, WNMU will also take the opportunity to prepare for ATSC 3.0 transmissions it hopes to commence in 2023.


licensees and the services they currently offer. NMU does not believe the public interest would be furthered by changing EBS eligibility, educational reservation or educational use requirements. The Commission's focus in this proceeding should be on adopting a process for rationalizing existing licensed GSAs and licensing new EBS stations in the white space so that the public interest benefits of EBS can be extended nationwide. NMU believes that EBS is an education resource that can offer new hope for residents in rural America who desperately need Internet connectivity.

Conclusion

NMU believes that its experience validates the proposition that EBS is an effective mechanism – perhaps the most effective mechanism -- to bring the promise of wireless broadband service to rural areas. This potential will be squandered unless the Commission preserves the essential nature of the EBS service and finishes the task of licensing EBS white space to local educational entities who are committed to doing so. NMU believes that if given a green-light, educators nationwide will seize the chance they've been waiting for to construct new EBS-based wireless networks to serve learners of all ages and their communities. NMU also believes that new licensing opportunities can provide institutions with existing networks, such as NMU, the chance to continue expanding their wireless services that serve the public interest. While other spectrum may be available to deploy wireless services, none has the unique characteristics of EBS that can propagate wireless broadband to unserved and underserved rural America. EBS is a resource with tremendous potential.

Respectfully submitted,

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Depiction of GSA Coverage Gaps Requiring Rationalization

